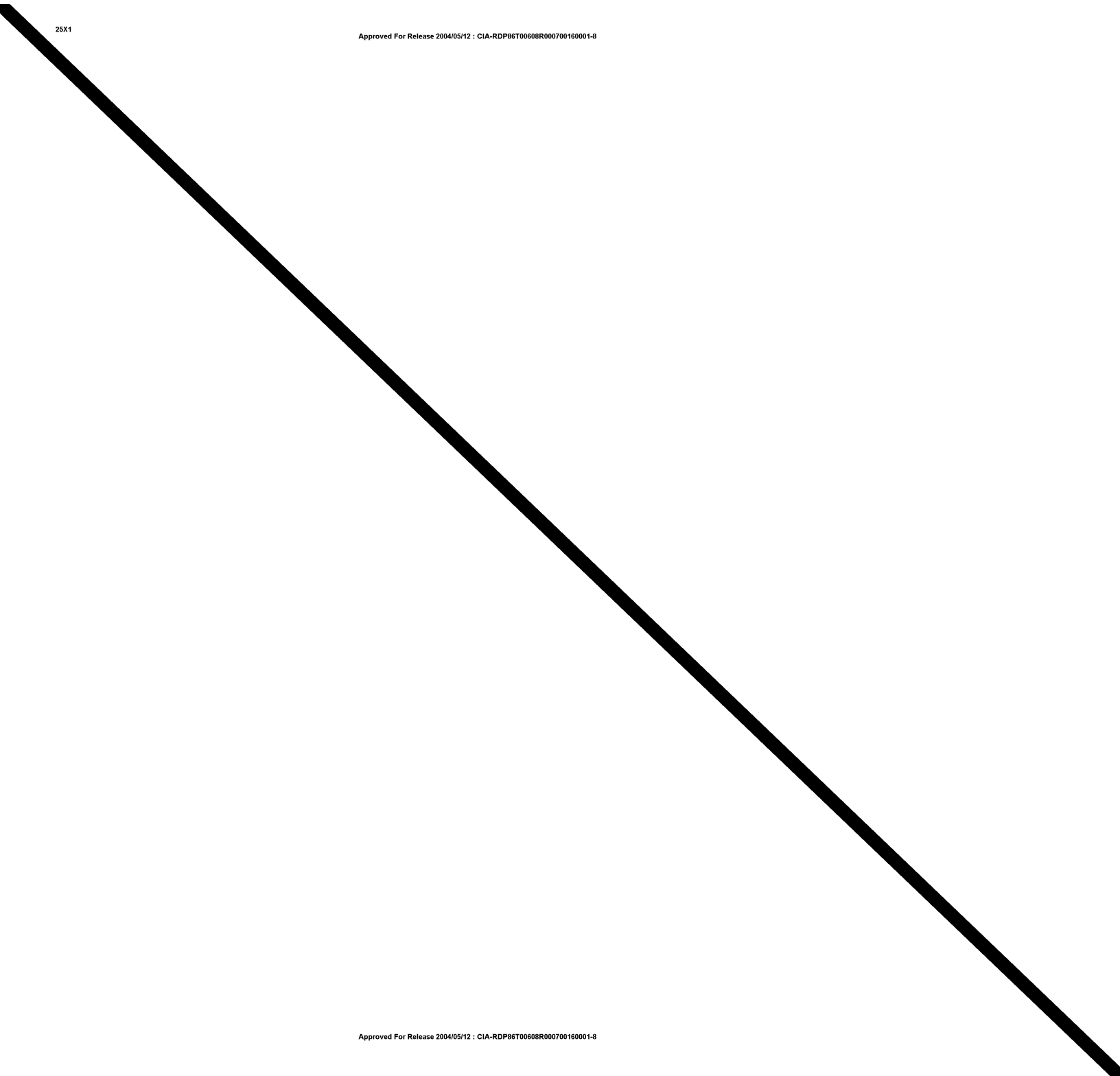

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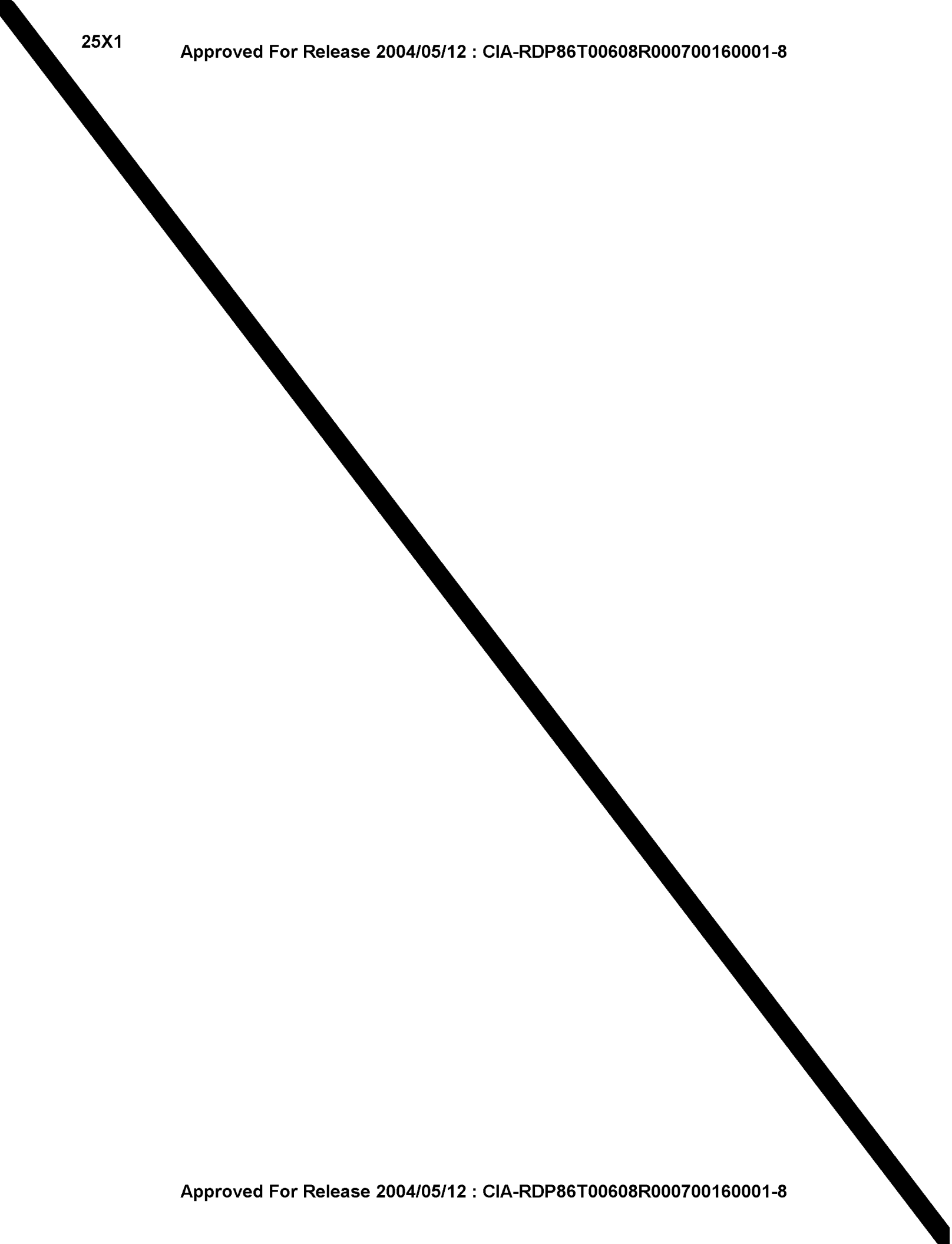

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Strategic Research Monthly Review

July 1975

This publication of the Office of Strategic Research contains substantive findings and analytical judgments that are preliminary in nature and have not been formally coordinated with other CIA and intelligence community components.

Comments and queries regarding the articles are welcomed. They may be directed to the person named following each item.

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Soviet Acquisition of US Aviation Technology: Opportunities and Constraints in Military Exploitation

Recent opportunities for the Soviets to acquire US hardware, especially aircraft, have triggered concern about the potential transfer of US weapons technology to the Soviet Union. The Soviets have been attempting to purchase wide-body passenger aircraft and to acquire other aviation technology from the US. Such purchases and the contacts they provide, plus the many exchange agreements spawned under detente, would afford many opportunities to exploit US technology. The Soviet's current aircraft design philosophy and procedures, however, could significantly limit the extent to which US aircraft technology would be adopted.

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Roadblocks to Technology Transfer. The acquisition of equipment and the transfer of technology are not synonymous. Because the transfer process is complex, the extent to which the Soviet Union could benefit from its acquisitions and the time required to achieve those benefits are difficult to estimate. The stringent design criteria imposed on Soviet weapon designers and the inflexibility of the military-industrial infrastructure suggest that wholesale adaptation of US technology would require the Soviet aircraft industry to depart drastically from its present R&D, manufacturing, and maintenance philosophies. In some critical areas US standards differ sharply from the Soviet equivalents:

- *Airframe Structural Efficiency.* The more sophisticated stress analysis applied to US aircraft might be exploited by the Soviets to reduce combat airframe weight and to increase payload or range. To incorporate these changes, however, would require a basic change in Soviet airframe design philosophy. Soviet designers must conform to rigorous design criteria imposed by the research institutes and are required to build airframes that are durable (i.e. capable of withstanding the stress of landings on unimproved runways) and relatively maintenance free. Incentives in the US aircraft industry, on the other hand, virtually force designers to incorporate new weight-saving features in each aircraft design. Both civilian and military aircraft customers demand minimum weight in aircraft structures to achieve the maximum load factor, or greater military payload, speed, and range.

- *Engine Performance and Maintainability.* US aircraft engines are superior to Soviet engines in thrust-to-weight ratio, fuel consumption, life span, and component reliability. US engine parts are built to closer tolerances, with better quality control and purer materials, than Soviet engines. Furthermore, US engine designs are quite different from their Soviet counterparts—they employ up to twice as many parts as comparable Soviet engines. The conversion of the Soviet aircraft industry from the production of short-life engines to more complex, long-life engines would require the development of more sophisticated metal-processing technology, a much more extensive repair parts supply system, more sophisticated ground test equipment, and more highly skilled maintenance personnel, particularly at the field level.

- *Avionics Packaging.* US avionics equipment can perform more functions under given weight and volume constraints than comparable Soviet equipment. To adopt the more advanced US electronics technology would also require the Soviets to make improvements in their manufacturing and support equipment technology.

Wholesale Conversion vs Selective Adaptation. The quality of Soviet scientific resources and the mechanism by which they are allocated suggest the Soviets have the ability to mobilize the resources necessary to overcome the obstacles to technology transfer. Their aircraft designers and R&D personnel are considered by

their US counterparts to have sound basic theoretical knowledge of aircraft design principles. Another advantage is the concentration of their best designers, R&D personnel, and skilled laborers in the defense sector of the economy. In addition, Soviet defense industries enjoy the highest priority for raw materials and capital equipment.

Despite the apparent ability to overcome the obstacles to technology transfer, the cost of restructuring defense industries and the time required for the Soviets to do so could largely offset any potential advance in reducing the existing gap in the state of the art. A wholesale conversion of the military aircraft industry to accommodate US technology is therefore unlikely. More likely is the selective adaptation of US technology in those instances when deficiencies in Soviet aircraft can be overcome easily or when improvements in combat effectiveness can be expected. Even then, the acquisition of US aircraft or components does not guarantee a successful transfer of technology, as economic and institutional obstacles, as well as technical feasibility problems, may inhibit such efforts.

Soviets Increasing Antiaircraft Artillery in Divisional Units

The Soviets are apparently increasing the number of 57mm S-60 antiaircraft guns in some of their divisional air defense regiments in East Germany. Each regiment normally has four batteries of vehicle-towed S-60s, totaling 24 guns. In the past several months, three of the regiments in East Germany have been observed with up to 36 guns--enough for two extra batteries.

confirmed the presence of additional S-60s in two more divisional air defense regiments. In September 1974 a column belonging to a tank division in the Neuruppin area was sighted with 35 S-60 guns,

In March 1975 a motorized rifle division's air defense regiment in the Doberitz area was twice observed with more than the normal 24 antiaircraft guns--once with 35 S-60s and another time with 30.

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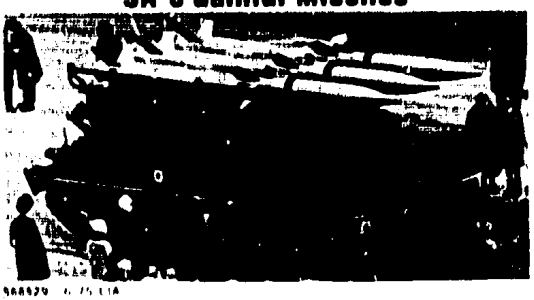
SA-6 Gainful Missiles



S-60 57mm Antiaircraft Gun

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The guns in the expanded regiments probably have been received from regiments whose guns were replaced by the SA-6 mobile surface-to-air missile system. In the past few years the SA-6 has replaced the S-60 in six of the 20 Soviet divisions in East Germany. (The 24 S-60 guns in each regiment were replaced by 20 SA-6 launchers, each with three missiles.)

SAM and AAA Mix? It is still unclear whether the addition of S-60s to some regiments indicates a Soviet intention to have a mixture of divisional SAM and AAA regiments or is an interim step pending delivery of additional missiles.

Over a year has passed since the Soviets last replaced the guns in a divisional air defense regiment in East Germany with the SA-6 missile system, possibly indicating they do not intend that all these units have SA-6 missiles. Another new air defense weapon—the SA-8 missile system—was introduced in the Sino-Soviet border area and could be deployed with units in Central Europe as well. The Soviets appear to be having production difficulties with this system, however, and it may be at least two or three years before they could introduce it in Central Europe. They may have decided to use the extra guns made available by SA-6 deliveries to reinforce existing S-60 regiments on an interim basis.

Even if all of the S-60s in Soviet divisions in Central Europe are replaced with missiles, the guns may be retained in the Group of Soviet Forces in Germany. S-60s might be used, for example, to form new batteries for defense of airfields and logistic support installations.

The Soviets have characteristically retained older but still useful equipment in the forces—to strengthen existing units or form additional units. For example, outmoded heavy tanks and World War II style assault guns were eliminated from divisions more than a decade ago, but some of these are still retained in separate regiments and battalions in the GSFG. The Soviet propensity for keeping older equipment as new systems are being introduced exerts pressure for higher manpower levels, apart from the change in manpower which the new equipment may itself entail.

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Iran Strengthens Its Air Force

Iran is significantly strengthening its air force by adding large quantities of new equipment. Current plans are to double fighter strength to about 480 aircraft by 1980 and to acquire substantially improved ordnance for greater combat effectiveness. Other developments under way include the construction of four new military airfields and the installation of a modern air defense system. The modernization program will ensure Tehran's air supremacy over the Persian Gulf and Arabian Sea, despite an anticipated shortage of skilled maintenance personnel that will limit the effectiveness of the new equipment.

Fighter Aircraft. Iran is upgrading its interceptor force by replacing its F-5 A/Bs with 141 of the newer F-5Es. The changeover will be complete by the end of 1975. The F-5E is more maneuverable in air-to-air combat and has a greater payload and combat radius than the F-5A/B. Iran also plans to acquire 28 F-5Fs beginning in 1976 to supplement the F-5E interceptor force and serve as trainers for the advanced interceptor, probably the F-16, that will replace the F-5 in the Iranian inventory during the 1980s.

Iran's force of fighter-bombers consists of 131 F-4D/E aircraft—about four times the 1970 strength. This total will increase to approximately 200 F-4s by early 1976. The F-4s are being equipped to increase their maneuverability and bombing effectiveness and to provide electronic countermeasures (ECM) against surface-to-air missiles. To increase the range and combat time of the F-4s, Iran has obtained six KC-135 tankers. Air-refueling training is under way, and by the end of 1975 all F-4 pilots probably will be qualified for air-to-air refueling in daylight operations. The Iranians plan to upgrade their fighter-bomber force by adding at least 80 F-14s beginning in the latter half of 1975 or early 1976, and they also have expressed interest in purchasing about 60 A-7 or A-10 attack bombers, with deliveries to begin in 1977.

Ordnance. The Iranians are interested in acquiring the most advanced ordnance with which to arm their aircraft. Their present inventory includes over 2,200 Maverick (AGM-65A) TV-guided air-to-ground missiles and several hundred AIM-9 Sidewinder and AIM-7 Sparrow air-to-air missiles. The Iranians will receive at least 600 more Mavericks from the US and reportedly are planning to coproduce an additional 5,000 of these missiles in Iran. To further upgrade air-to-ground ordnance and significantly increase its accuracy, Iran has purchased some 1,500 kits for laser-guided bombs, which can be used with the bombs already in the inventory. Iran will also purchase about 250 Condor (AGM-53A) advanced air-to-surface missiles beginning in 1977 if the US decides to begin production. This missile, with an

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Bases and Air Defense. To accommodate and protect the increased numbers of combat aircraft, four new military airbases are under construction, in addition to the six bases already in use *(see map)*, and a new air defense system is being installed. The new bases at Bandar Abbas and Chah Bahar will give the air force an increased capability to operate over the southern Persian Gulf and the Arabian Sea. By 1980 each of the main operating bases will be protected by a sophisticated air defense

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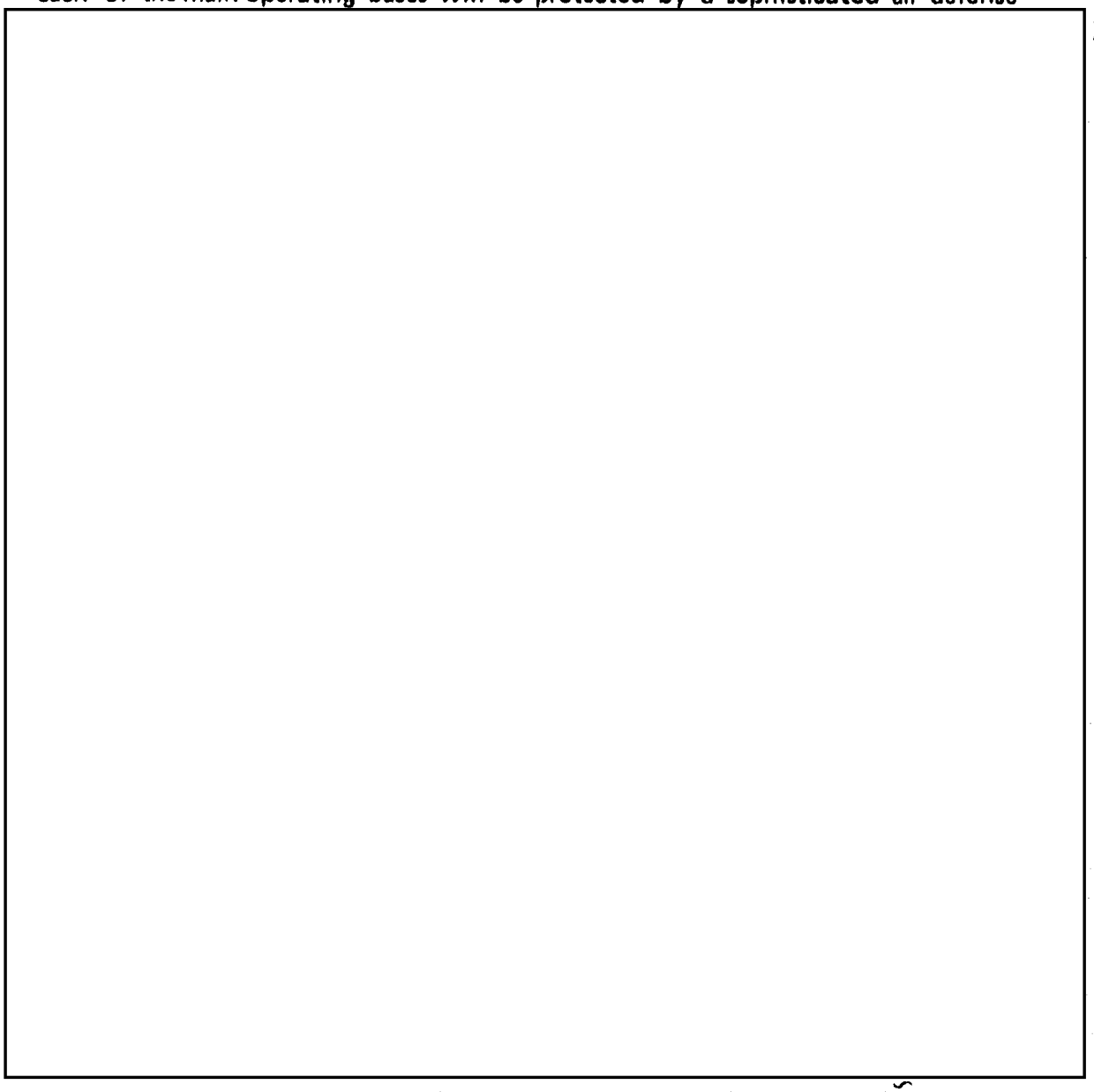

Lack of Technical Skills. The shortage of technically qualified personnel to man and maintain equipment for the air force is already a severe problem and it will worsen with future acquisitions of new and more sophisticated equipment. Difficulties reportedly have already been encountered in maintaining the aircraft

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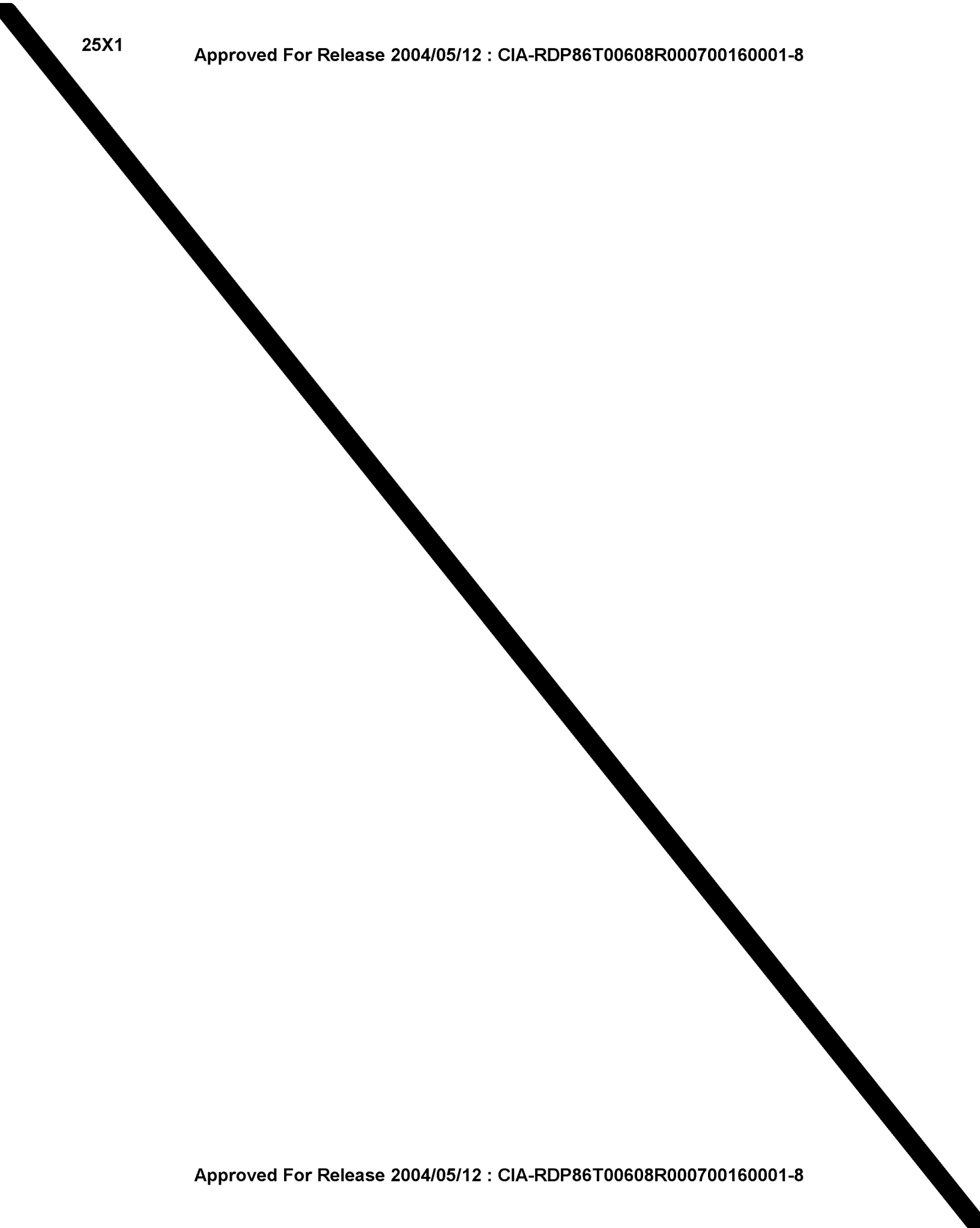

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also strengthening its air force and will acquire over 100 F-5s from the US. Despite these programs, Iran's air force will remain superior because of better-trained personnel and a greater quantity and quality of equipment. The strengthening of the air force and the extension of air bases along the southern Iranian coast will also enable the air force to support the Shah's expressed goal of assuming a dominant role over the oil shipping lanes of the southern Persian Gulf and the Arabian Sea.

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Libya Seeks To Expand and Improve Its Air Force

Libya is buying sophisticated aircraft, including fighters and medium bombers, both to expand and upgrade its air force and to enhance Libyan influence in the Arab world. Although these acquisitions will increase the inventory of aircraft by more than half, persistent operational and maintenance deficiencies are likely to prevent any early improvement in combat capabilities.

The Libyan air force has come a long way since it was established in 1962 with three light aircraft and fewer than 100 men. Personnel strength may now have reached 4,000 men, primarily as the result of an intensive recruiting campaign launched after the military takeover in 1969. The current aircraft inventory—mostly acquired in the early seventies—includes about 95 French Mirage III and Mirage 5 fighters, at least 13 Soviet MIG-23 Floggers, 8 F-5 Freedom Fighter fighter-bombers, 8 C-130 Hercules medium transports, 9 C-47 Dakota light transports, 3 T-33 trainers, 10 Yugoslav G2-A Galeb trainers, 6 French Super Frelon helicopters, and 12 assorted utility helicopters.

All aircraft are currently deployed in the northern coastal area, although Tripoli is considering long-term plans to develop several inland bases. Uqba bin Nafi (the former US Wheelus Air Force Base) is the principal operating base and the site of air force headquarters (see map). Five

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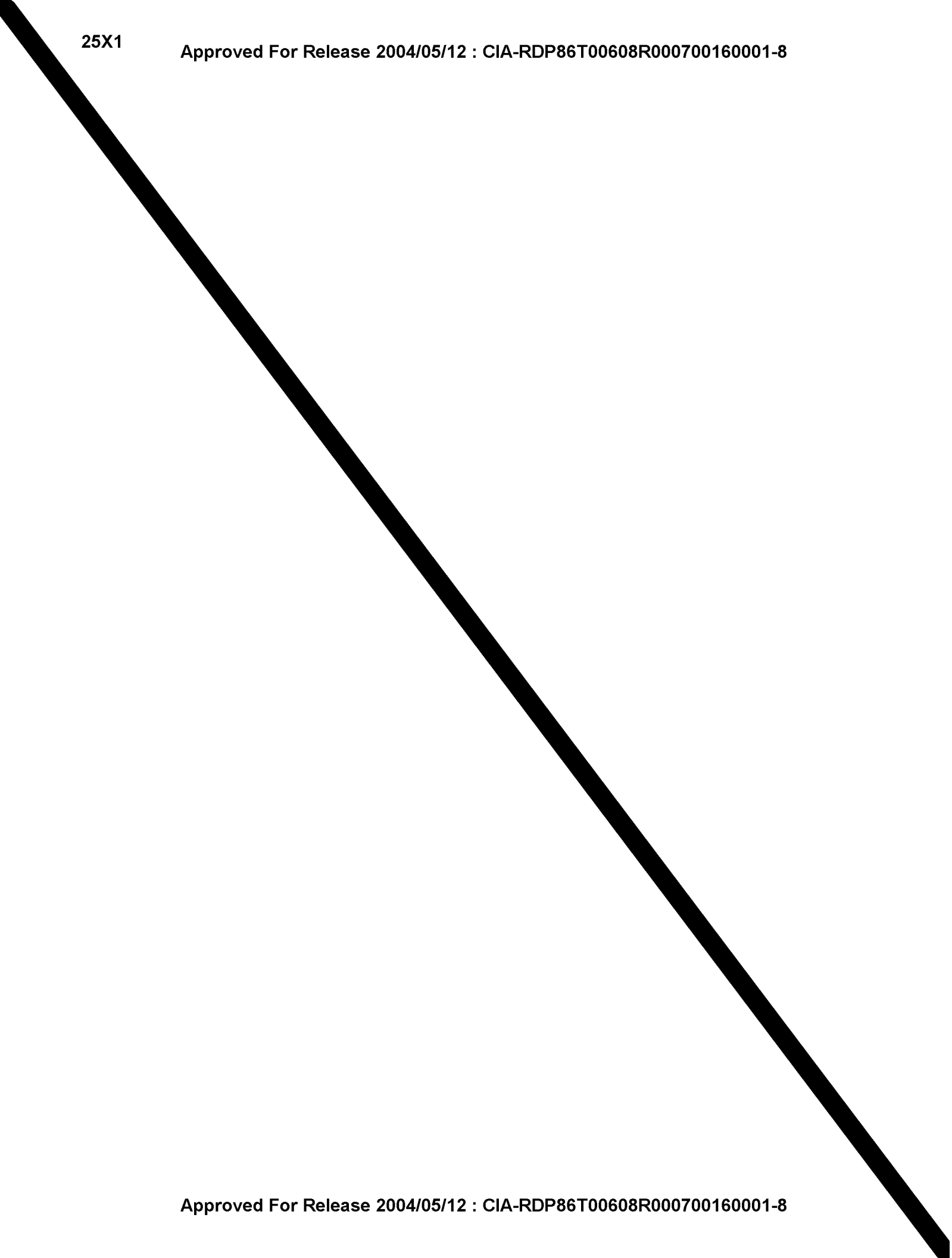

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Weaknesses. The new equipment is unlikely to lessen—and may well exacerbate—several chronic air force problems. With only about 100 pilots, the air force already has more aircraft than Libyan pilots to operate them. The foreign and domestic training programs probably will be unable to keep pace with the manning and ground-crew requirements for the new acquisitions. Even after several years of operational experience, Libyan aircrews have achieved only a low level of proficiency, and they would fare poorly in most combat situations. Monthly flying time per pilot is scarcely sufficient to meet safety standards, much less to develop skills in combat maneuvers. Maintenance already is a problem and will likely be aggravated, particularly with regard to keeping adequate stocks of spare parts for the diversity of aircraft. Even with current levels of foreign assistance for maintenance and operational support—provided by an estimated 325 Pakistani, French, Soviet, and Greek air force personnel**—a large fraction of the inventory is inoperative at any one time. Tripoli almost certainly will need additional advisers as it acquires more aircraft.

Motivations. Efforts to expand and improve the air force (and the army and navy as well) have been politically motivated. Tripoli is buying weapons to enhance its defensive capabilities, but the Qadhafi regime also views the amassment of arms as a means to increase Libya's influence in Arab councils. In the event of renewed hostilities with Israel, Libya's growing accumulation of aircraft and armaments could permit it to play a more effective role as a source of resupply for other Arab countries. Of the aircraft on hand, Libya could transfer some of its Mirages to Egypt as it did in 1973. Floggers and possibly the Mirage F-1s eventually could also be candidates for transfer.

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Italian Arms Sales to Third World Countries

Representatives of Italian weapons producers are aggressively seeking business throughout the world, with the active support of their government. The motivation for the government's effort to increase arms sales appears to be primarily economic, aimed at improving the country's adverse balance of payments and holding down unemployment.

Although some weapons are being sold to NATO allies, the strongest emphasis is on increasing Italy's share of the weapons trade with Third World countries. This policy seeks to take advantage of the current demand for military hardware among developing countries, especially oil-exporting nations which are absorbing large amounts of Italian currency.

Italy stands third among European countries—well behind France and the United Kingdom—in military arms sales to the Third World. The Italians account for less than 15 percent of that trade and a much smaller part of worldwide arms production and sales. Yet their aggressive arms export policy has involved them in political relationships and cooperative military ventures with most of the Third World countries.

Among the equipment designed and produced by Italy and marketed abroad, jet trainers and other light aircraft have been most popular, along with the traditional Italian small arms and ammunition. In recent years, Italian shipbuilders also have developed sales of military craft. Miniature submarines are actively marketed throughout the Third World, and larger vessels are currently under construction for the Venezuelan and Peruvian navies.

Pressure for US Approval. A substantial percentage of the arms marketed by Italy throughout the world involves systems, including jet aircraft and military vehicles, designed in the US and other countries and built under license in Italy. US approval is required for sales of such popular items as the M-113 armored personnel carrier, Agusta-Bell 206 and 212 helicopters, and the Sea Sparrow missile. Approval depends on US policy toward the recipient country and on the prospect that the sales might interfere with potential US sales of the same products.

Italy's prospective customers frequently are countries which run into problems with one or the other of these US provisos. Consequently, Italy is continually pressing the US for approval of contracts for licensed goods.

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A special trade relationship appears to be developing between Italy and Libya. Libya was responsible last year for better than 20 percent of Italy's oil supply and would like to supply an even greater portion of Italian oil needs. In exchange, Libya has made arms purchases in Italy and proposes to buy more if US approval for licensed equipment can be obtained. Both governments appear to attach importance to the development of this special relationship, which could lead to substantial Libyan investment in Italian industry.

No Strings Attached. Many Italian products are popular with Third World countries because no direct political or military strings are attached to them. Transactions with Italy often evade some of the complications involved in obtaining arms from the major powers. For these reasons small countries sometimes prefer to obtain US-developed systems from Italy—or other licensed producers—even though it may cost more than if purchased from the US.

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